

Electoral Backlash or Positive Reinforcement? Wind Power and Congressional Elections in the United States

Replication Results

Johannes Urpelainen
Johns Hopkins SAIS

Alice Tianbo Zhang
Washington and Lee University

November 7, 2021

Contents

1	Main Paper – Tables and Figures	2
2	Appendix – Tables and Figures	10

1 Main Paper – Tables and Figures

	(1) Capacity	(2) Count	(3) log(Capacity)	(4) log(Count)
Mean wind potential * time	37.208*** (9.131)	21.325*** (5.294)	0.144*** (0.025)	0.127*** (0.022)
Observations	2868	2868	2868	2868
Districts	287	287	287	287
R^2	0.73	0.98	0.86	0.90
F -statistic	16.61	16.23	33.15	32.51

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

	Democratic Vote		Incumbent Vote	
	(1) Model	(2) Model	(3) Model	(4) Model
<i>Panel A: OLS</i>				
Cumulative capacity (MW)	0.006** (0.003)		-0.002 (0.003)	
Cumulative count		0.011** (0.005)		-0.004 (0.005)

<i>Panel B: IV</i>				
Cumulative capacity (MW)	0.030*** (0.011)		0.008 (0.012)	
Cumulative count		0.050** (0.019)		0.013 (0.020)
Observations	1143	1143	1038	1038
Districts	287	287	285	285
R^2	0.88	0.88	0.73	0.73

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

	Democratic Incumbent		Republican Incumbent	
	(1) Model	(2) Model	(3) Model	(4) Model
<i>Panel A: OLS</i>				
Cumulative capacity (MW)	-0.009* (0.005)		-0.012 (0.008)	
Cumulative count		-0.015* (0.008)		-0.021 (0.013)

<i>Panel B: IV</i>				
Cumulative capacity (MW)	0.058 (0.054)		-0.030 (0.020)	
Cumulative count		0.099 (0.092)		-0.049 (0.034)
Observations	576	576	407	407
Districts	159	159	128	128
R^2	0.77	0.77	0.75	0.75

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

	Turnout		log(Turnout)	
	(1) Model	(2) Model	(3) Model	(4) Model
<i>Panel A: OLS</i>				
Cumulative capacity (MW)	-0.338 (4.363)		0.000 (0.000)	
Cumulative count		-1.295 (7.235)		0.000 (0.000)
<hr/> <hr/>				
<i>Panel B: IV</i>				
Cumulative capacity (MW)	-18.159 (18.905)		-0.000 (0.000)	
Cumulative count		-30.350 (31.486)		-0.000 (0.000)
Observations	1143	1143	1142	1142
Districts	287	287	287	287
R^2	0.97	0.97	0.97	0.97

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

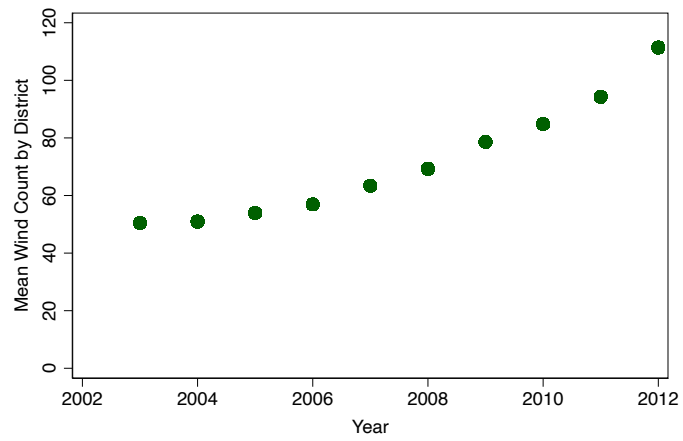
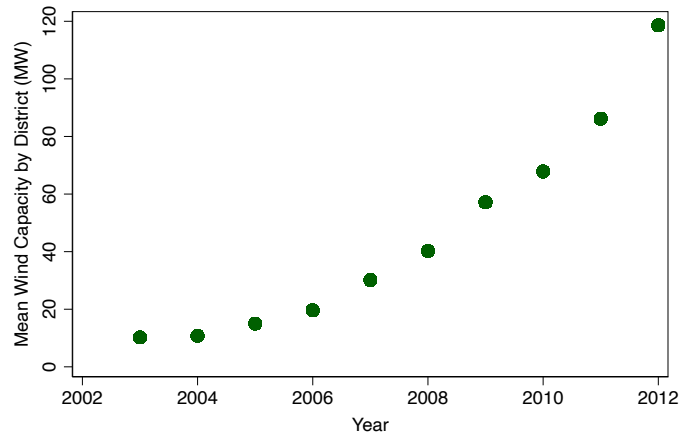
	Pro-Environment Vote		Anti-Environment Vote	
	(1) Model	(2) Model	(3) Model	(4) Model
<i>Panel A: OLS</i>				
Cumulative capacity (MW)	0.012** (0.005)		-0.010** (0.005)	
Cumulative count		0.023** (0.009)		-0.019** (0.009)
<hr/> <hr/>				
<i>Panel B: IV</i>				
Cumulative capacity (MW)	0.025** (0.011)		-0.031*** (0.011)	
Cumulative count		0.044** (0.019)		-0.054*** (0.020)
Observations	2868	2868	2868	2868
Districts	287	287	287	287
R^2	0.86	0.86	0.87	0.87

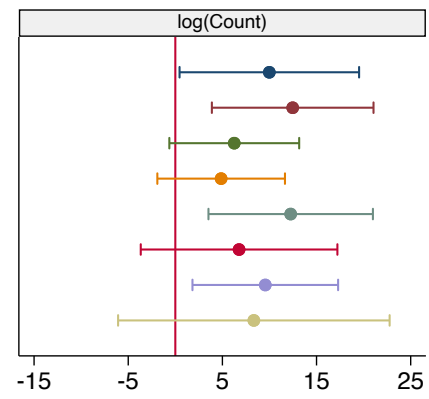
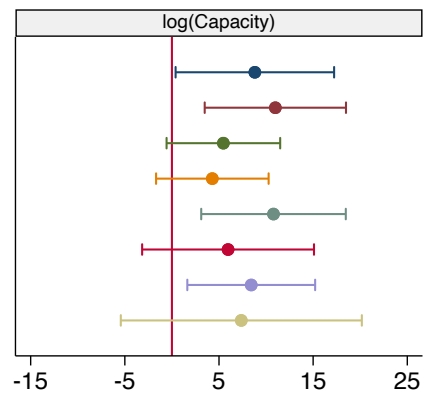
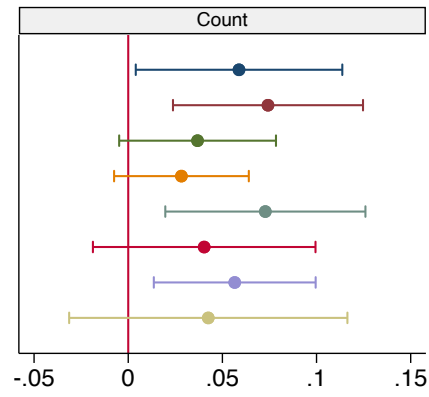
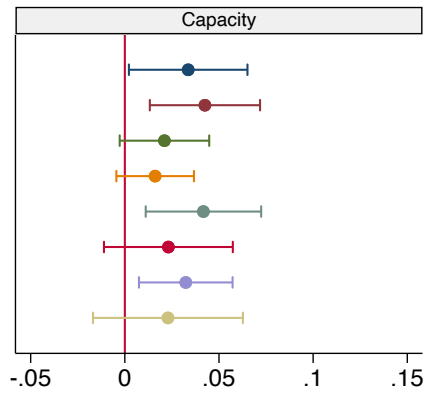
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

	Construction		Power Generation		Manufacturing	
	(1) Model	(2) Model	(3) Model	(4) Model	(5) Model	(6) Model
<i>Panel A: March Employment</i>						
log(Cumulative capacity+1)	30.507 (65.690)		11.155 (7.802)		29.460 (36.804)	
log(Cumulative count+1)		34.636 (74.615)		12.665 (8.769)		33.446 (41.771)
Observations	2870	2870	2870	2870	2870	2870
Districts	287	287	287	287	287	287
R^2	0.72	0.72	0.56	0.56	0.83	0.83
	Construction		Power Generation		Manufacturing	
	(1) Model	(2) Model	(3) Model	(4) Model	(5) Model	(6) Model
<i>Panel B: Annual Payroll (thousands)</i>						
log(Cumulative capacity+1)	0.266 (1.412)		-0.099 (0.211)		1.054 (1.191)	
log(Cumulative count+1)		0.302 (1.604)		-0.113 (0.241)		1.197 (1.348)
Observations	2870	2870	2870	2870	2870	2870
Districts	287	287	287	287	287	287
R^2	0.76	0.76	0.69	0.69	0.30	0.30
	Construction		Power Generation		Manufacturing	
	(1) Model	(2) Model	(3) Model	(4) Model	(5) Model	(6) Model
<i>Panel C: No. Establishments</i>						
log(Cumulative capacity+1)	0.192 (0.452)		1.297*** (0.378)		0.242* (0.137)	
log(Cumulative count+1)		0.218 (0.513)		1.472*** (0.435)		0.275* (0.156)
Observations	2870	2870	2870	2870	2870	2870
Districts	287	287	287	287	287	287
R^2	0.95	0.95	0.70	0.70	0.71	0.71

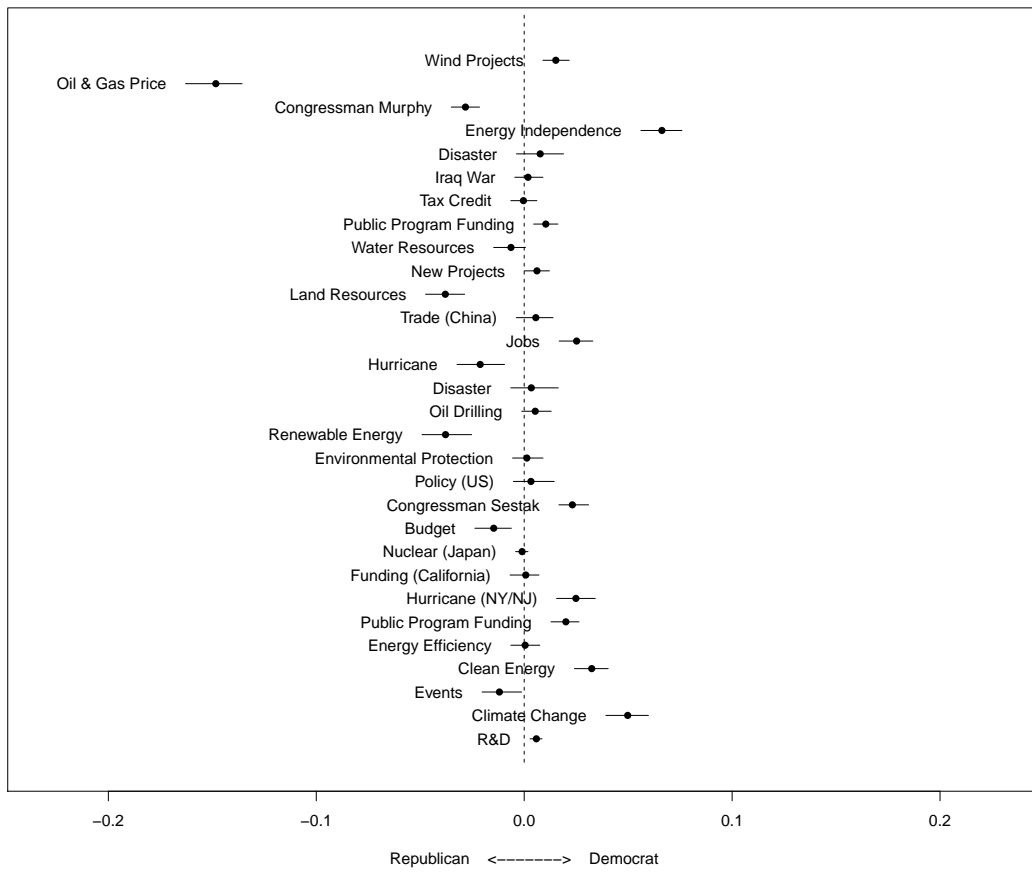
Standard errors in parentheses

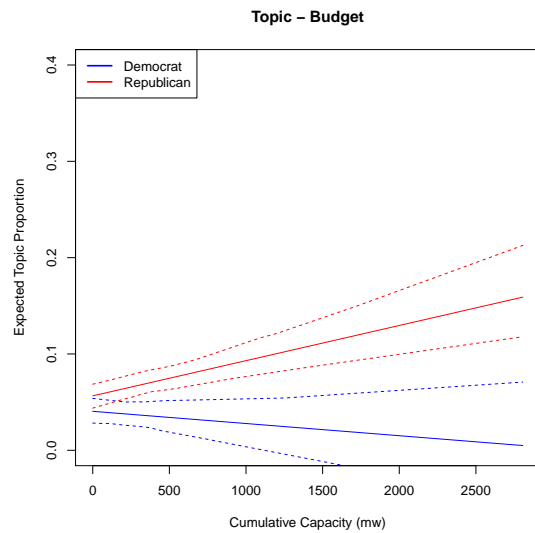
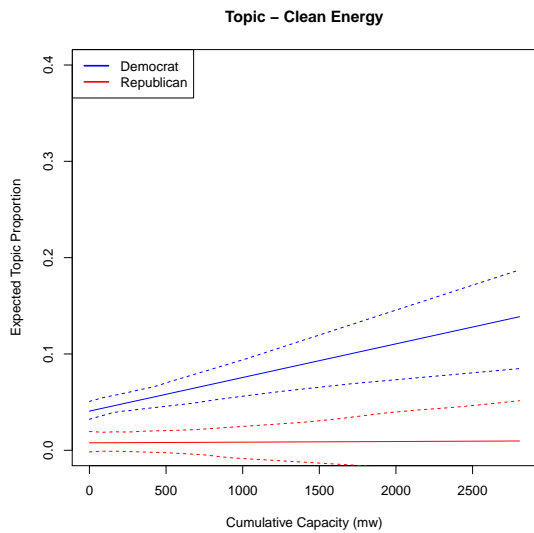
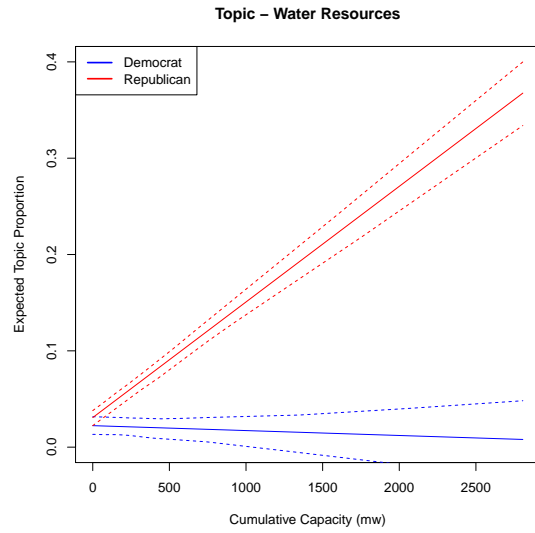
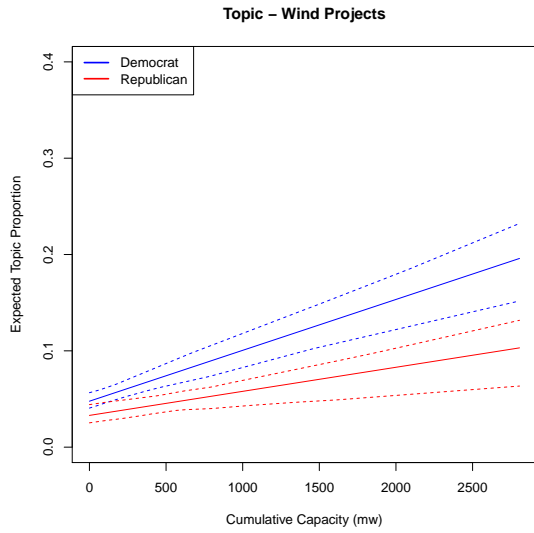
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$





Effect of Partisanship: Democrat vs. Republican





2 Appendix – Tables and Figures

	Mean	SD	Min	Max	Obs
<i>Wind Turbine Installation</i>					
Cumulative number of wind turbines	71.40	408.17	0	5040	2870
Cumulative capacity of wind turbines (MW)	45.57	209.71	0	2936	2870
Number of wind turbines	6.33	35.62	0	680	2870
Capacity of wind turbines (MW)	11.18	65.45	0	1321	2864
<i>Zonal Wind Potential</i>					
mean of zonal wind potential	1.70	0.52	1	4	2870
std of zonal wind potential	0.52	0.32	0	2	2870
min of zonal wind potential	1.13	0.34	1	2	2870
median of zonal wind potential	1.57	0.59	1	4	2870
max of zonal wind potential	3.56	1.75	1	7	2870
<i>Roll Call Vote Outcome</i>					
Pro-environment vote share	56.38	40.54	0	100	2868
Anti-environment vote share	40.15	40.31	0	100	2868
<i>Election Outcome</i>					
Incumbent vote share	69.82	13.83	39	100	2602
Democratic candidate vote share	55.39	23.05	0	100	2868
Republican candidate vote share	44.28	22.95	0	100	2867
<hr/>					
	2004	2006	2008	2010	
Total number of votes (thousand)	263.25 (57.75)	191.26 (52.88)	279.81 (60.16)	202.31 (50.47)	
Democratic candidates vote share (%)	54.07 (23.99)	59.64 (22.07)	61.03 (21.70)	51.54 (19.23)	
Republican candidates vote share (%)	45.93 (23.99)	40.36 (22.07)	38.97 (21.70)	48.46 (19.23)	
Third party candidates vote share (%)	2.01 (3.51)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	
Incumbent candidates vote share (%)	71.50 (12.67)	69.78 (14.93)	70.72 (14.24)	64.72 (12.96)	
Number of Democrats in the House	201.01 (0.24)	232.00 (0.00)	257.00 (0.00)	194.12 (8.42)	
Number of Republicans in the House	233.00 (0.00)	203.31 (3.06)	178.53 (3.60)	242.00 (0.00)	
Number of Independents in the House	1.00 (0.00)	0.01 (0.10)	0.00 (0.00)	0.00 (0.00)	
Districts	287	287	285	285	

	With Wind	Without Wind	Overall		
<i>Demographics</i>					
Total population (thousand)	691.6 (60.80)	682.4 (59.96)	685.4 (60.36)		
White (%)	0.835 (0.121)	0.696 (0.196)	0.740 (0.187)		
Native, born outside of U.S. (%)	0.0104 (0.00758)	0.0135 (0.0120)	0.0125 (0.0109)		
Male (%)	0.494 (0.00832)	0.491 (0.0121)	0.492 (0.0111)		
Older than 65 (%)	0.135 (0.0245)	0.124 (0.0237)	0.127 (0.0245)		
<i>Income & Poverty</i>					
Median household income (\$1000)	51.54 (10.56)	54.34 (15.19)	53.45 (13.95)		
Per capita income (\$1000)	25.74 (4.673)	27.73 (8.500)	27.10 (7.559)		
Median gross rent (\$)	768.6 (194.8)	904.9 (251.7)	861.7 (243.5)		
Income at or above poverty level (%)	0.852 (0.0441)	0.843 (0.0645)	0.846 (0.0590)		
<i>Education</i>					
Male with associate degrees and above	0.222 (0.0554)	0.240 (0.0836)	0.235 (0.0763)		
Female with associate degrees and above	0.235 (0.0533)	0.251 (0.0771)	0.246 (0.0708)		
<i>Employment</i>					
Employment in agriculture (%)	0.0247 (0.0237)	0.0118 (0.0228)	0.0159 (0.0238)		
Employment in manufacturing (%)	0.127 (0.0516)	0.112 (0.0489)	0.117 (0.0502)		
Mean hours worked	38.43 (0.843)	38.65 (1.041)	38.58 (0.987)		
Observations	637	1372	2009		
	(1) Pop	(2) White	(3) Foreign	(4) Male	(5) 65+
Mean wind potential * time	1.8492** (0.7664)	-0.0016* (0.0009)	0.0001 (0.0001)	0.0001 (0.0001)	0.0003 (0.0002)
Observations	2009	2009	2009	2009	2009
Districts	287	287	287	287	287

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

	(1) Med Inc	(2) PC Inc	(3) Med Rent	(4) Abv Poverty
Mean wind potential * time	-0.0207 (0.0600)	-0.0312 (0.0310)	-2.9939** (1.3053)	-0.0001 (0.0005)
Observations	2009	2007	2009	2009
Districts	287	287	287	287

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

	(1) Avg Hrs	(2) Male AS+	(3) Female AS+	(4) Empl Ag	(5) Empl Manuf
Mean wind potential * time	-0.0109 (0.0113)	-0.0002 (0.0003)	-0.0002 (0.0003)	-0.0001 (0.0002)	0.0003 (0.0003)
Observations	2009	2009	2009	2009	2009
Districts	287	287	287	287	287

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

	Liberal (%)		Ideology (5-Point Scale)	
	(1) Model	(2) Model	(3) Model	(4) Model
<i>Panel A: Reduced Form</i>				
Mean wind potential * time	0.001 (0.002)	0.001 (0.002)	-0.001 (0.005)	-0.001 (0.005)
<hr/> <hr/>				
<i>Panel B: OLS</i>				
log(Cumulative capacity+1)	0.001 (0.002)		0.004 (0.006)	
log(Cumulative count+1)		0.002 (0.002)		0.008 (0.006)
<hr/> <hr/>				
<i>Panel C: IV</i>				
log(Cumulative capacity+1)	0.005 (0.013)		-0.004 (0.033)	
log(Cumulative count+1)		0.005 (0.015)		-0.004 (0.037)
Observations	2009	2009	2009	2009
Districts	287	287	287	287

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

	Democratic Vote		Republican Vote		Incumbent Vote	
	(1) Model	(2) Model	(3) Model	(4) Model	(5) Model	(6) Model
<i>Panel A: OLS</i>						
Cumulative capacity (MW)	0.006** (0.003)		-0.006** (0.003)		-0.002 (0.003)	
Cumulative count		0.011** (0.005)		-0.011** (0.005)		-0.003 (0.005)
<i>Panel B: IV</i>						
Cumulative capacity (MW)	0.023** (0.010)		-0.023** (0.010)		0.012 (0.012)	
Cumulative count		0.039** (0.017)		-0.039** (0.017)		0.020 (0.020)
Observations	931	931	931	931	838	838
Districts	234	234	234	234	232	232
R^2	0.89	0.89	0.89	0.89	0.73	0.73

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

	Democratic Vote		Republican Vote		Incumbent Vote	
	(1) Model	(2) Model	(3) Model	(4) Model	(5) Model	(6) Model
<i>Panel: IV</i>						
Cumulative capacity (MW)	0.037** (0.014)		-0.037** (0.014)		0.020 (0.017)	
Cumulative count		0.062** (0.025)		-0.062** (0.025)		0.034 (0.028)
Observations	770	770	770	770	689	689
Districts	193	193	193	193	193	193
R^2	0.83	0.83	0.83	0.83	0.62	0.62

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

	Pro-Environment Vote		Anti-Environment Vote	
	Model	Model	Model	Model
<i>Panel: IV</i>				
Cumulative capacity (MW)	0.025* (0.013)		-0.030** (0.014)	
Cumulative count		0.044** (0.022)		-0.053** (0.024)
Observations	1929	1929	1929	1929
Districts	193	193	193	193
R^2	0.84	0.84	0.83	0.83

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

	Democratic Vote		Republican Vote		Incumbent Vote	
	(1) Model	(2) Model	(3) Model	(4) Model	(5) Model	(6) Model
<i>Panel A: OLS</i>						
Cumulative capacity (MW)	0.001 (0.002)		-0.001 (0.002)		-0.003** (0.001)	
Cumulative count		0.002 (0.003)		-0.002 (0.003)		-0.004*** (0.002)
<i>Panel B: IV</i>						
Cumulative capacity (MW)	0.016** (0.008)		-0.016** (0.008)		0.000 (0.006)	
Cumulative count		0.026** (0.013)		-0.026** (0.013)		0.001 (0.010)
Observations	1271	1271	1271	1271	1160	1160
Districts	319	319	319	319	317	317
R^2	0.87	0.87	0.87	0.87	0.69	0.69

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

	Democratic Vote		Republican Vote		Incumbent Vote	
	(1) Model	(2) Model	(3) Model	(4) Model	(5) Model	(6) Model
<i>Panel A: OLS</i>						
Cumulative capacity (MW)	0.006* (0.003)		-0.006* (0.003)		-0.002 (0.003)	
Cumulative count		0.011** (0.005)		-0.011** (0.005)		-0.004 (0.004)
<i>Panel B: IV</i>						
Cumulative capacity (MW)	0.030** (0.011)		-0.030** (0.011)		0.008 (0.013)	
Cumulative count		0.050** (0.019)		-0.050** (0.019)		0.013 (0.021)
Observations	1143	1143	1143	1143	1038	1038
States	25	25	25	25	24	24
R^2	0.88	0.88	0.88	0.88	0.73	0.73

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

	Democratic Vote		Republican Vote		Incumbent Vote	
	(1) Model	(2) Model	(3) Model	(4) Model	(5) Model	(6) Model
<i>Panel: IV</i>						
Cumulative capacity (MW)	0.026* (0.014)		-0.026* (0.014)		0.024 (0.016)	
Cumulative count		0.046* (0.024)		-0.046* (0.024)		0.041 (0.027)
Total population (thousand)	-0.014 (0.029)	-0.014 (0.029)	0.014 (0.029)	0.014 (0.029)	0.054* (0.031)	0.055* (0.031)
White (%)	-28.099 (23.298)	-27.829 (23.336)	28.099 (23.298)	27.829 (23.336)	-7.256 (19.174)	-6.817 (19.198)
Median gross rent (\$)	0.032* (0.017)	0.032* (0.017)	-0.032* (0.017)	-0.032* (0.017)	0.015 (0.018)	0.015 (0.018)
Observations	856	856	856	856	765	765
Districts	287	287	287	287	279	279
R^2	0.90	0.90	0.90	0.90	0.78	0.78

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

	Pro-Environment Vote		Anti-Environment Vote	
	(1) Model	(2) Model	(3) Model	(4) Model
<i>Panel: IV</i>				
Cumulative capacity (MW)	0.024* (0.013)		-0.023* (0.013)	
Cumulative count		0.043* (0.022)		-0.041* (0.023)
Total population (thousand)	-0.013 (0.031)	-0.013 (0.030)	0.023 (0.026)	0.023 (0.026)
White (%)	-14.963 (18.999)	-14.069 (19.014)	4.569 (16.529)	3.705 (16.534)
Median gross rent (\$)	-0.000 (0.016)	-0.000 (0.016)	-0.017 (0.016)	-0.017 (0.016)
Observations	2007	2007	2007	2007
Districts	287	287	287	287
R^2	0.87	0.87	0.88	0.88

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

	Democratic Vote		Republican Vote		Incumbent Vote	
	(1)	(2)	(3)	(4)	(5)	(6)
	Model	Model	Model	Model	Model	Model
<i>IV: Median</i>						
Cumulative capacity (MW)	0.028** (0.013)		-0.028** (0.013)		0.022 (0.015)	
Cumulative count		0.047** (0.023)		-0.047** (0.023)		0.037 (0.026)
<i>IV: Maximum</i>						
Cumulative capacity (MW)	0.009 (0.016)		-0.009 (0.016)		-0.017 (0.014)	
Cumulative count		0.015 (0.026)		-0.015 (0.026)		-0.028 (0.024)
Observations	1143	1143	1143	1143	1038	1038
Districts	287	287	287	287	285	285
R^2	0.89	0.89	0.89	0.89	0.73	0.73

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

	Pro-Environment Vote		Anti-Environment Vote	
	(1)	(2)	(3)	(4)
	Model	Model	Model	Model
<i>IV: Median wind potential * time</i>				
Cumulative capacity (MW)	0.027* (0.014)		-0.041** (0.017)	
Cumulative count		0.047* (0.025)		-0.072** (0.029)
<i>IV: Max wind potential * time</i>				
Cumulative capacity (MW)	0.028 (0.019)		-0.027 (0.019)	
Cumulative count		0.049 (0.033)		-0.048 (0.034)
Observations	2868	2868	2868	2868
Districts	287	287	287	287
R^2	0.86	0.86	0.87	0.87

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

	Democratic Vote		Republican Vote		Incumbent Vote	
	Model	Model	Model	Model	Model	Model
<i>IV: Mean wind potential * National wind capacity</i>						
Cumulative capacity (MW)	0.032**		-0.032**		0.007	
	(0.013)		(0.013)		(0.013)	
Cumulative count		0.052**		-0.052**		0.011
		(0.021)		(0.021)		(0.021)
Observations	1143	1143	1143	1143	1038	1038
States	287	287	287	287	285	285
R^2	0.88	0.88	0.88	0.88	0.73	0.73

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

	Democratic Turnout		Republican Turnout		Independent Turnout	
	(1) Model	(2) Model	(3) Model	(4) Model	(5) Model	(6) Model
<i>Panel A: First stage</i>						
Mean wind potential * time	0.357**	0.352*	0.346*	0.354	0.394*	0.375
	(0.175)	(0.187)	(0.202)	(0.216)	(0.218)	(0.237)

<i>Panel B: IV</i>						
log(Cumulative capacity+1)	-0.048		-0.037		0.103	
	(0.046)		(0.063)		(0.123)	
log(Cumulative count+1)		-0.048		-0.036		0.108
		(0.047)		(0.062)		(0.130)
Observations	145	145	125	125	84	84
Districts	127	127	112	112	76	76
R^2	0.20	0.20	0.07	0.06	0.12	0.08

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

	Pro-Environment Vote		Anti-Environment Vote	
	(1) Model	(2) Model	(3) Model	(4) Model
<i>Panel A: OLS</i>				
log(Cumulative capacity+1)	0.350		-0.453	
	(0.472)		(0.438)	
log(Cumulative count+1)		0.394		-0.544
		(0.539)		(0.510)

<i>Panel B: IV</i>				
log(Cumulative capacity+1)	1.356		-3.504*	
	(1.854)		(1.802)	
log(Cumulative count+1)		1.539		-3.979*
		(2.109)		(2.067)
Observations	2860	2860	2860	2860
Districts	287	287	287	287
R^2	0.95	0.95	0.96	0.96

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

	(1) Pro-Environment Vote	(2) Anti-Environment Vote
Mean wind potential * time	-0.114 (0.499)	-0.204 (0.596)
Observations	1713	1713
Districts	239	239
R^2	0.88	0.89

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

	Environment v. Job		Global Warming	
	(1) Model	(2) Model	(3) Model	(4) Model
<i>Panel A: Dummy Dependent Var</i>				
log(Cumulative capacity+1)	-0.023 (0.015)		0.018 (0.025)	
log(Cumulative count+1)		-0.026 (0.017)		0.020 (0.028)
Observations	1435	1435	1721	1721
Districts	287	287	287	287
R^2	0.67	0.67	0.62	0.62

<i>Panel B: Ordinal Dependent Var</i>				
log(Cumulative capacity+1)	-0.029 (0.039)		0.003 (0.049)	
log(Cumulative count+1)		-0.033 (0.044)		0.003 (0.055)
Observations	1435	1435	1721	1721
Districts	287	287	287	287
R^2	0.82	0.82	0.71	0.71

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

A. Linear Trend Break				
	(1) Capacity (MW)	(2) Count	(3) Log Capacity	(4) Log Count
RPS \times Event Time	13.580*** (4.495)	7.436** (3.078)	0.100*** (0.023)	0.089*** (0.020)
Observations	4696	4696	4696	4696
States	28	28	28	28
R^2	0.09	0.06	0.20	0.16

B. Average Effect				
	Capacity (MW)	Count	Log Capacity	Log Count
RPS	37.996** (13.727)	20.129** (9.120)	0.422*** (0.115)	0.383*** (0.107)
Observations	4696	4696	4696	4696
States	28	28	28	28
R^2	0.08	0.06	0.19	0.15

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

A. Linear Trend Break			
	(1) Democratic Vote	(2) Republican Vote	(3) Incumbent Vote
RPS \times Event Time	0.205* (0.115)	-0.335*** (0.118)	-0.441* (0.228)
Observations	4696	4696	4150
States	28	28	28
R^2	0.11	0.11	0.10

B. Average Effect			
	Democratic Vote	Republican Vote	Incumbent Vote
RPS	4.386*** (1.202)	-4.472*** (1.188)	-1.106 (1.450)
Observations	4696	4696	4150
States	28	28	28
R^2	0.11	0.11	0.10

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

A. Linear Trend Break			
	(1) Pro-Environment Vote	(2) Pro Clean Energy Vote	(3) Anti-Environment Vote
RPS \times Event Time	-0.274 (0.225)	1.413*** (0.429)	-0.407 (0.263)
Observations	9682	6245	9682
States	28	28	28
R^2	0.18	0.12	0.18

B. Average Effect			
	Pro-Environment Vote	Pro Clean Energy Vote	Anti-Environment Vote
RPS	4.640*** (1.050)	11.146*** (3.635)	-7.658*** (1.139)
Observations	9682	6245	9682
States	28	28	28
R^2	0.18	0.12	0.18

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

